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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/730,982	12/10/2003	Atuhito Mochida	2003_1798A	5135

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WENDEROTH, LIND & PONACK, L.L.P.
2033 K STREET N. W.
SUITE 800
WASHINGTON, DC 20006-1021

EXAMINER

EDMONDSON, LYNNE RENEE

ART UNIT	PAPER NUMBER
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1725

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/08/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/730,982

Applicant(s)

MOCHIDA ET AL.

Examiner

Lynne Edmondson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 October 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 18-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 18-23,25,27,28,30,31,33 and 34 is/are rejected.
- 7) ☒ Claim(s) 24,26,29,32 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 18-22, 30 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hawrylo (USPN 4576326).

Hawrylo teaches a method of mounting a semiconductor component by heating a bonding member (14) on a submount (12) on a heating table and positioning the component which is heated and pressed by a collet (thermocompression tool) on the submount with pressure (figures 1, 4, col 1 lines 9-45, col 2 line 60 – col 3 line 27). The collet and table are heated to an appropriate temperature (col 4 lines 15-25) however the temperatures are not further disclosed. Neither is keeping heat from the heating table away of the collet or releasing the device before complete solidification.

It would have been obvious to one of ordinary skill in the art at the time of the invention to control heating of both the collet and table during each phase of bonding to prevent thermal damage to the devices. During placement heating both to the same temperature will prevent warping. As the heating table comprises a heatsink (12) most heat will stay below the collet and be drawn to the sink. It is unlikely that heat would flow upward to the collet when there is heatsink present and the tool has its own heat

source. By releasing the device prior to complete solidification the part can align itself without risk of damage due to collet pressure.

3. Claims 23, 25, 31 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hawrylo (USPN 4576326) as applied to claims 18-22 and 30 above, and further in view of Powers et al. (US 2004/0195297 A1).

Hawrylo teaches a method of mounting a semiconductor component by heating a bonding member (14) on a submount (12) on a heating table and positioning the component which is heated and pressed by a collet (thermocompression tool) on the submount with pressure (figures 1, 4, col 1 lines 9-45, col 2 line 60 – col 3 line 27). The collet and table are heated to an appropriate temperature (col 4 lines 15-25).

However the bonding member is not further disclosed.

Powers teaches bonding a semiconductor component with a bonding material comprising at least two elements having different fusing points, including Au/Sn and In, wherein the component is held in place until solidified (paragraphs 10 and 19-21).

It would have been obvious to one of ordinary skill in the art at the time of the invention to make the bonding pads of a lead free solder with at least two metals with different fusing points or a material with a melting point less than eutectic solder to provide reliable, environmentally safe, bonds over a narrow temperature range thereby avoiding damage to the component and substrate.

4. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hawrylo (USPN 4576326) as applied to claims 18-22 and 30 above, and further in view of Kurpiela (USPN 5579979).

Hawrylo teaches a method of mounting a semiconductor component by heating a bonding member (14) on a submount (12) on a heating table and positioning the component which is heated and pressed by a collet (thermocompression tool) on the submount with pressure (figures 1, 4, col 1 lines 9-45, col 2 line 60 – col 3 line 27). The collet and table are heated to an appropriate temperature (col 4 lines 15-25).

However although the collet has a larger portion, a larger contacting side is not disclosed.

Kurpiela teaches a soldering collet comprising a large contacting side (figure 2 and col 2 lines 45-61).

It would have been obvious to one of ordinary skill in the art at the time of the invention to employ a collet with a larger contacting side to facilitate rework and that the collect contact area is relative to the size of the component being attached at the time and can change when different components are bonded.

5. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hawrylo (USPN 4576326) as applied to claims 18-22 and 30 above, and further in view of Laub et al. (USPN 3790738).

Hawrylo teaches a method of mounting a semiconductor component by heating a bonding member (14) on a submount (12) on a heating table and positioning the

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component which is heated and pressed by a collet (thermocompression tool) on the submount with pressure (figures 1, 4, col 1 lines 9-45, col 2 line 60 – col 3 line 27). The collet and table are heated to an appropriate temperature (col 4 lines 15-25).

However the collet material is not disclosed.

Laub teaches a semiconductor bonding method using a low conductivity collet (col 3 lines 35-59 and col 4 lines 5-35) with temperature control (col 7 line 58 – col 8 line 4).

It would have been obvious to one of ordinary skill in the art at the time of the invention to employ a low conductivity collet to prevent thermal damage to the devices.

Response to Arguments

6. Applicant's arguments with respect to claims 18-23, 25, 27, 28, 30, 31, 33 and 34 have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

7. Claims 24, 26, 29 and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yasuda et al. (USPN 6827501 B2).

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne Edmondson whose telephone number is (571) 272-1172. The examiner can normally be reached on Monday through Thursday from 7:00 a.m. to 5:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lynne Edmondson
Primary Examiner
Art Unit 1725

LRE

LYNNE R. EDMONDSON
PRIMARY EXAMINER

LRE
12/17/03